UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Washington, DC 20460

APR 8 2015

OFFICE OF
AIR AND RADIATION

Gregory D. Hoenert
Emissions Certification Manager
Caterpillar Inc.
P.O. Box 600
Mossville, IL 61552-0600

Dear Mr. Hoenert:

The U.S. Environmental Protection Agency (EPA) has reviewed your request for extending the conditional verification of the Caterpillar Locomotive Selective Catalytic Reduction (SCR) System by Caterpillar Inc. (Caterpillar). This technology was originally granted a conditional verification on December 19, 2012. Based on our evaluation of your progress towards full verification and additional information provided, EPA hereby grants a one year extension to this conditional verification. This conditional verification will now expire one year from the date of this letter.

The technology is approved for use on the following locomotive engine(s) provided all of the operating criteria are met as described below:

Technology	Engine Model/Application	Fuel, Max Sulfur (ppm)	Reductions (%)			
			PM	NO_x	HC	CO
Caterpillar Locomotive Selective Catalytic Reduction System (SCR) System	Caterpillar 3516, heavy duty, line-haul locomotive engine; originally manufactured to meet Tier 2 standards for model years 2010–2011 and remanufactured to meet Tier 1+ standards for model years 2012–2013; turbocharged with power ratings 2650 ≤ Horsepower ≤ 3005	15	10	50 to 75	90	70

The following criteria must be met in order for appropriately retrofitted engines to achieve the aforementioned emission reductions:

1. The locomotive must be operated on ultra-low sulfur diesel fuel (ULSD) of 15 ppm or less.

2. A lower NO_x emission reduction of 50% is expected when used in switcher applications, while a 75% reduction was demonstrated in line haul testing.
3. The locomotive must always have a supply of Diesel Exhaust Fluid (DEF) that meets and displays certification of the American Petroleum Institute ISO Standard 22241-1 quality requirements that ensures the proper purity and concentration of 32.5% of urea. The engines and locomotives must be designed to track and log, in nonvolatile computer memory[1], all incidents of engine operation with inadequate DEF injection or DEF quality.
4. The SCR system shall not be sold or operated in geographic areas where the DEF may freeze (-11°C), unless it is equipped with tank heaters and DEF line heaters to prevent freezing.
5. To ensure the appropriate DEF is purchased, the customer is required to maintain DEF purchase receipts and refill records and make them available to Caterpillar upon request. DEF usage log and mileage records will be collected and analyzed by Caterpillar on a semi-annual basis.
6. Caterpillar is required to provide the operator with clear and visible instructions for maintaining DEF for proper system operation.
7. Each installation will be equipped with a monitoring system that displays warning lights visible to the operator and audible alarms for low DEF tank level, high SCR inlet temperature and system abnormalities. The monitoring system will also store diagnostic error codes related to DEF tank level and system malfunctions.
8. The engine exhaust temperature must achieve at least 240 °C for 40% of operation and not exceed 550 °C. Caterpillar will review actual locomotive operating conditions and perform temperature data-logging prior to retrofitting a locomotive with the Caterpillar Locomotive SCR System to ensure compatibility. In the event that a locomotive's application and/or duty cycle changes, temperature data-logging must be repeated to confirm that the engine exhaust temperature still meets the above criteria.
9. The Caterpillar Locomotive SCR System may require replacement if SCR inlet temperature exceeds 550 °C for an extended, continuous period of time. Operation with temperatures above 550 °C may require inspection for damage by Caterpillar.
10. The Caterpillar Locomotive SCR catalyst should be replaced after 15,000 hours of operation or when the locomotive is rebuilt/remanufactured, whichever comes first.
11. Caterpillar is responsible for informing customers, in writing, that disposal of the Caterpillar Locomotive SCR System must be in accordance to all applicable federal, state, and local laws.

Information on the Caterpillar Locomotive SCR System, percent reduction, and applicable engines will be posted on the EPA's Verified Technology List website at: http://www.epa.gov/cleandiesel/verification/verif-list.htm. EPA reserves the right to review and/or revoke this conditional verification if these operating criteria are not met or if information

[1] Non-volatile storage is computer memory that can retain stored information even when not powered.

becomes available regarding the safety, design and/or operation of the technology. In addition, Caterpillar must continue to satisfy the terms of the conditional verification as outlined under a separate December 19, 2012 letter to Caterpillar to achieve full EPA verification of this technology.

Thank you for participating in EPA's Technology Assessment Center Verification Program. If you have any questions or comments, please contact Britney J. McCoy, of my staff, at (202) 343-9218.

Sincerely,

Karl Simon, Director
Transportation and Climate Division
Office of Transportation and Air Quality